REMARKS

This case has been carefully reviewed in light of the Office Action of 05/24/2002, in which claims 1-4, 10-15, and 20-26 were rejected under 35 USC 103(a) as being unpatentable over Reinacher et al., U.S. Patent No. 3,622,310; and claims 9 and 27-34 were rejected under 35 USC 103(a) as being unpatentable over Reinacher et al. in view of Selman et al., U.S. Patent No. 3,640,705. In this amendment, the abstract of the disclosure and the specification have been amended; claims 1-4, 9-15, and 20-34 have been cancelled; and new claims 35-58 have been added. Furthermore, a declaration under 37 CFR 132 is included in this Response and is attached hereto. Reconsideration in light of the preceding amendment, the attached declaration, and the following remarks is respectfully requested.

A detailed discussion of the applied references has been undertaken in previous prosecution of this application. Reinacher et al. discuss alloys comprising platinum, 1-49 percent palladium, and 1-49 percent rhodium, along with 0.1-5 percent of a metal such as zirconium, titanium, hafnium, tantalum, aluminum, beryllium, and the like, as dispersion strengthening additions to the alloys. Selman et al. also discuss alloys of platinum group metals with oxide-forming elements to form dispersion-strengthened alloys, and their uses in various applications, including jet engines and rocket motors.

The claims rejected under these applied references have been cancelled. Applicants respectfully submit new claims 35-58, which recite alloys consistent with the originally filed claims. As the Examiner has stated previously, Reinacher et al. do not explicitly disclose the compositions claimed in the present application. Applicants respectfully submit that Selman et al. also do not disclose Applicants' claimed compositions.

Applicants state in several places in the present application (such as, for example, paragraph 0021) that the specific composition ranges recited in claims 35-58 represent specially designed formulations based on a balance of several composition-property relationships. These relationships are complicated and, in many cases, compete with one another, creating the need for trade-offs to be made. Neither of the applied references teaches, suggests, or discloses the existence of such composition-property relationships, or the need for trade-offs to be made in formulating alloys of this type. Applicants therefore respectfully submit that the alloy compositions recited in the claims of the present application represent unexpected results in light of the prior art, and herewith include the declaration under 37 CFR 132 by Dr. Melvin R. Jackson, a co-inventor in the present application, in support of this contention.

As described in Dr. Jackson's declaration, a complex experimental procedure was used to arrive at the particular alloy compositions of the present application. First, a large number of alloy compositions were evaluated for several different properties deemed by Applicants to be most important for the particular uses envisioned for the alloy. Second, specification limits and relative weightings were determined for each of these properties. Third, a multi-variable optimization was performed on the data in light of the specifications and relative weightings, and the optimal alloy

composition range for the given set of weightings and specification limits was calculated. Applicants note that what was optimized here were the many competing structure-property relationships determined by Applicants and not taught, suggested, or disclosed by either of the applied prior art references. Multiple optimizations were performed, each with a unique set of specifications and relative property weightings, depending upon the particular type of use envisioned for the alloy, as described in the declaration. The alloy compositions recited in claims 35-58 represent the culmination of this innovative experimental program. Applicants respectfully submit that the particular alloy compositions recited in these claims constitute results that would be unexpected to one skilled in the art, because the applied prior art fails to teach, suggest, or disclose

a. the particular set and combinations of alloy properties used by Applicants;
b. the quantitative structure-property relationships determined by Applicants;
c. the specification limits and relative weightings used by Applicants to evaluate alloys; and
d. the need to use a technique such as multi-variable optimization to balance the numerous trade-offs discovered by Applicants.

In view of the foregoing, Applicants respectfully submit that the application is in condition for allowance. Favorable reconsideration and prompt allowance of the application are respectfully requested.

Respectfully submitted,

Paul J. DiConza

Paul J. DiConza
Reg. No. 48,418
General Electric Company
Building K1, Room 3A60
Schenectady, New York 12301

21 June 2002

Telephone: (518) 387-6131

Attachment: Declaration

**Version with markings to show changes made**

**Abstract**

An alloy and a gas turbine engine component comprising an alloy are presented, with[,] the alloy [consisting essentially of rhodium, platinum, and palladium, wherein the alloy comprises a microstructure that is essentially free of L12 – structured phase at a temperature greater than about 1000°C.] comprising:

palladium, in an amount ranging from about 1 atomic percent to about 41 atomic percent;

platinum, in an amount that is dependent upon the amount of palladium, such that

a. for the amount of palladium ranging from about 1 atomic percent to about 14 atomic percent, the platinum is present up to about an amount defined by the formula (40 + X) atomic percent, wherein X is the amount in atomic percent of the palladium, and

b. for the amount of palladium ranging from about 15 atomic percent up to about 41 atomic percent, the platinum is present in an amount up to about 54 atomic percent; and

the balance comprising rhodium, wherein the rhodium is present in an amount of at least 24 atomic percent;

wherein the alloy comprises a microstructure that is essentially free of L12 – structured phase at a temperature greater than about 1000°C.

**Paragraph beginning on page 2, line 15**

The present invention provides several embodiments that address this need. One embodiment is an alloy [consisting essentially of rhodium, platinum, and palladium, wherein the alloy comprises a microstructure that is essentially free of L12 – structured phase at a temperature greater than about 1000°C.] comprising

palladium, in an amount ranging from about 1 atomic percent to about 41 atomic percent;

platinum, in an amount that is dependent upon the amount of palladium, such that

a. for the amount of palladium ranging from about 1 atomic percent to about 14 atomic percent, the platinum is present up to about an amount defined by the formula (40 + X) atomic percent, wherein X is the amount in atomic percent of the palladium, and

b. for the amount of palladium ranging from about 15 atomic percent up to about 41 atomic percent, the platinum is present in an amount up to about 54 atomic percent; and

the balance comprising rhodium, wherein the rhodium is present in an amount of at least 24 atomic percent;

wherein the alloy comprises a microstructure that is essentially free of L12 – structured phase at a temperature greater than about 1000°C.

**Paragraph beginning on page 2, line 19**

A second embodiment is an alloy [consisting essentially of] comprising from about 5 atomic percent to about 40 atomic percent platinum and the balance comprising rhodium, wherein the alloy further comprises a microstructure that is essentially free of L12 – structured phase at a temperature greater than about 1000°C.

**Paragraph beginning on page 2, line 23**

A third embodiment is a gas turbine engine component comprising an alloy, the alloy [consisting essentially of rhodium, platinum, and palladium, wherein the alloy of the gas turbine engine component comprises a microstructure that is essentially free of L12 – structured phase at a temperature greater than about 1000°C.] comprising:

palladium, in an amount ranging from about 1 atomic percent to about 41 atomic percent;

platinum, in an amount that is dependent upon said amount of palladium, such that

a. for said amount of palladium ranging from about 1 atomic percent to about 14 atomic percent, said platinum is present up to about an amount defined by the formula (40 + X) atomic percent, wherein X is the amount in atomic percent of said palladium, and

b. for said amount of palladium ranging from about 15 atomic percent up to about 41 atomic percent, said platinum is present in an amount up to about 54 atomic percent;

from about 0 atomic percent to about 5 atomic percent of a metal selected from the group consisting of zirconium, hafnium, titanium, and mixtures thereof;

from about 0 atomic percent to about 5 atomic percent ruthenium; and

the balance comprising rhodium, wherein said rhodium is present in an amount of at least 24 atomic percent;

wherein said alloy of said gas turbine engine component further comprises a microstructure that is essentially free of L12 – structured phase at a temperature greater than about 1000°C.